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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Shinji Sakashita

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EXAMINER

VELASQUEZ, VANESSA T

ART UNIT

PAPER NUMBER

1793

NOTIFICATION DATE

DELIVERY MODE

03/17/2010

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/522,779	Applicant(s) SAKASHITA ET AL.	
	Examiner Vanessa Velasquez	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 December 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,7-9,11-13 and 15-18 is/are pending in the application.
- 4a) Of the above claim(s) 15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,7-9,11-13 and 16-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 3-6, 10, and 14 remain canceled. Claim 15 is withdrawn from consideration. Claims 1, 11, 17, and 18 are amended. Currently, claims 1, 2, 7-9, 11-13, and 16-18 are presented for examination on the merits. Of the claims presented for examination on the merits, claim 1 is independent.

Status of Previous Rejections Under 35 USC § 103

The previous rejections of claims 1, 2, 7, 9, 11-13, and 16-18 under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. in view of Grunke et al., and further in view of Lütjering et al. and Yao et al. are maintained.

The previous rejection of claim 8 under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. in view of Grunke et al., Lütjering et al., and Yao et al., as applied to claim 1, and further in view of Kobayashi et al. is maintained.

Amended claim limitations are addressed below.

Claim Rejections - 35 USC § 112, First Paragraph

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

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2. Claims 1, 2, 7-9, 11-13, and 16-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention.

Claims 1, 17, and 18 recite that the Al content between the Ti-Al alloy and the oxide layer is 25%, 16%, and 6% or less, respectively. These ranges include the range of zero percent to less than 0.8%, which is new matter because the original specification provides no support for such a range. Claims 2, 7-9, 11-13, and 16 are likewise rejected for depending on a rejected base claim. See also MPEP 2163.04(III) regarding amendments to ranges.

Claim Rejections - 35 USC § 112, Second Paragraph

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1, 2, 7-9, 11-13, and 16-18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 17, and 18 recite that the Al content between the Ti-Al alloy and the oxide layer is 25%, 16%, and 6% or less, respectively. These ranges include the range of zero percent to less than 0.8%. However, claim 1 requires that the average Al concentration be 0.8-25%. It is unclear how the Al content can be simultaneously zero

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percent, yet also have a non-zero average Al concentration of 0.8-25%. Claims 2, 7-9, 11-13, and 16 are likewise rejected for depending on a rejected base claim.

Claims 1, 17, and 18 are indefinite for failing to specify units for the aluminum content. It is requested that units (e.g., weight, mass percent etc.) be specified to clearly set forth the metes and bounds of the invention. Claims 2, 7-9, 11-13, and 16 are likewise rejected for depending on a rejected base claim.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation

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under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 1, 2, 7, 9, 11-13, and 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. (EP 1 126 139 A) in view of Grunke et al. (US 4,936,927), and further in view of Lütjering et al. (*Titanium*) and Yao et al. (US 6,066,359). The claims remain rejected for substantially the same reasons described in the Office action dated October 5, 2009.

Regarding the amended portion of claim 1, Grunke et al. teach an aluminum diffusion layer (Al concentration layer) applied on top of a titanium or titanium alloy part, but do not expressly teach a specific average or total amount of aluminum amount in the diffusion layer. However, it is well held that discovering an optimum value of a result-effective variable involves only routine skill in the art (MPEP § 2144.05). In the present instance, Grunke et al. teach that the aluminum concentration and distribution of the aluminum within in the diffusion zone is a result-effective variable because it would directly affect the oxidation resistance of the material as well as mechanical properties such as stiffness and ductility (col. 3, lines 1-11; col. 4, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art to have optimized the concentration and distribution of aluminum in the diffusion layer in order to achieve desired oxidation resistance and mechanical properties.

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In addition, Grunke et al. teach that it is most preferable for the amount of aluminum in the diffusion layer to decrease gradually from the surface inward, and that longer diffusion heat treatment times will result in the aluminum forming a solid solution in the titanium and traveling farther into the alloy (col. 3, lines 62-68; col. 6, lines 27-34; Fig. 3a & 3b). The act of diffusion would spread the aluminum atoms over a wider volume of titanium, thereby decreasing the initial aluminum concentrations in the lamellar structure of Fig. 2a. For instance, the aluminum would diffuse into the Ti/Ti alloy structural component base, thereby increasing the volume of titanium through which the aluminum atoms travel. Therefore, an amount of aluminum more dilute than the individual lamellar amounts of 53.0%, 36.0%, and 15.8% by mass in the TiAl_2 , TiAl , and Ti_3Al layers would not only be possible but also necessarily occur for longer diffusion heat treatment times. One of ordinary skill in the art would be motivated to conduct heat treatment for longer times in order to obtain a titanium part with relatively few abrupt changes in properties as ideally shown in Fig. 3a.

9. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyamoto et al. (EP 1 126 139 A) in view of Grunke et al. (US 4,936,927), Lütjering et al. (*Titanium*), and Yao et al. (US 6,066,359), as applied to claim 1, and further in view of Kobayashi et al. (EP 0 816 007 A2). The claim remains rejected for substantially the same reasons described in the Office action dated October 5, 2009.

Response to Arguments

10. Applicant's arguments filed 12/16/2009 have been fully considered but they are not persuasive.

First, Applicant argues that the prior art do not acknowledge that the titanium alloys described therein have hydrogen absorption resistance properties. In response to Applicant's argument that the prior art do not teach the same reasons as the claimed invention for the addition of an oxide layer or aluminum concentration layer, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). In the present case, the product suggested by the prior art would inherently possess hydrogen absorption resistance properties as the references, taken together, teach the claimed product.

Second, Applicant argues that Miyamoto does not suggest that its alloy should be covered by an oxide film. Applicant also argues that Yao does not teach an oxide film at least 50% crystalline formed by oxidizing Ti-Al alloy. In response, Applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Third, Applicant argues that Grunke teaches that the average aluminum concentration is 35% or at the very least "approximately 26%," which is higher than the

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claimed 0.8-25%. In response, approximately 26% is extremely close to the claimed upper bound of 25%. It is well established that non-overlap may constitute a *prima facie* case of obviousness if the values are so close that one of ordinary skill in the art would expect the claimed product and that of the prior art to possess the same properties (discussed in MPEP § 2144.05). In the present case, the a value of 25% aluminum and approximately 26% aluminum is so close that one of ordinary skill in the art would not expect a substantial difference in properties absent evidence to the contrary.

Applicant's attention is directed to the most preferred embodiment in Grunke. Grunke et al. teach that it is most preferable for the amount of aluminum in the diffusion layer to decrease gradually from the surface inward, and that longer diffusion heat treatment times will result in the aluminum forming a solid solution in the titanium and traveling farther into the alloy (col. 3, lines 62-68; col. 6, lines 27-34; **Fig. 3a & 3b**). The act of diffusion would spread the aluminum atoms over a wider volume of titanium, thereby decreasing the initial aluminum concentrations in the lamellar structure of Fig. 2a. For instance, the aluminum would diffuse into the Ti/Ti alloy structural component base, thereby increasing the volume of titanium through which the aluminum atoms travel. Therefore, an amount of aluminum more dilute than the individual lamellar amounts of 53.0%, 36.0%, and 15.8% by mass in the TiAl_2 , TiAl , and Ti_3Al layers would not only be possible but also necessarily occur for longer diffusion heat treatment times. One of ordinary skill in the art would be motivated to conduct heat treatment for longer times in order to obtain a titanium part with relatively few abrupt changes in properties as ideally shown in Fig. 3a. Therefore, a value of about 25% aluminum in the diffusion

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layer, or even lower, would not be unreasonable provided that diffusion were carried for a time such that aluminum diffused into the base Ti/Ti alloy.

Fourth, Applicant argues that one of ordinary skill in the art would be motivated to ensure that the aluminum concentration in the diffusion layer of Grunke is around 40 atom percent to improve oxidation resistance. In response, aluminum in a proportion of 40 at.% is about 27 mass %, which lies very close to the claimed 25%. In addition, Lütjering teaches that the amount of aluminum oxide increases with aluminum concentration (p. 49-50). Thus, depending on the amount of aluminum oxide desired in the film, it would have been obvious to one of ordinary skill in the art to optimize the amount of aluminum in the diffusion layer of Grunke based on the desired amount of aluminum oxide needed to protect the titanium-aluminum part. In the case that a thin film of alumina is needed, only lower amounts of aluminum in the diffusion layer would be needed and vice versa in the case of thick films, a higher concentration of aluminum would be needed. These variables are well known and may be routinely manipulated by one of ordinary skill in the art.

Fifth, Applicant argues that one of ordinary skill in the art would not have coated and heated an oxidation resistant alloy in order to improve Kobayashi's method of fiction welding. In response, the Examiner would like clarify that the rejection of claim 8 was not made for reasons of coating the titanium aluminum of Miyamoto, Grunke, Lütjering, and Yao. Kobayashi is cited to show that titanium aluminum alloys have been bonded to steel, which reads on the claimed "titanium alloy of Claim 1 in contact with a steel member." Placing a titanium aluminum alloy in contact -- whether it be a mechanically

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fastened, chemically bonded, or physically attached – with a steel component does not patentably distinguish the claimed titanium alloy from the prior art, as it is otherwise demonstrated and known to attach titanium aluminum alloys to steel alloys as taught by Kobayashi.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vanessa Velasquez whose telephone number is 571-270-3587. The examiner can normally be reached on Monday-Friday 9:00 AM-6:00 PM ET.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached at 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

/Vanessa Velasquez/
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